

A satellite image of the Earth from space, showing the Western Hemisphere. The Americas are visible, with North and South America in shades of green and brown, surrounded by blue oceans and white cloud patterns. The curvature of the planet is evident at the edges.

California Global Warming Solutions Act of 2006

Workshop on Mandatory Reporting of California GHG Emissions

Implementation of
AB 32 Requirements

California Air Resources Board
August 15, 2007 - Cal/EPA Headquarters

Workshop Agenda

- Introduction
- Overview of Regulation and Reporting Requirements
- General Stationary Combustion Sources
- Verification Requirements
 - Break for Lunch
- Sector Specific Reporting Requirements and Calculation Methods₂

Participation Information

- Workshop materials:
<http://www.arb.ca.gov/cc/ccei/ccei.htm>
- Draft regulation:
<http://www.arb.ca.gov/cc/ccei/reporting/reporting.htm>
- Webcast information:
<http://www.calepa.ca.gov/broadcast/>
- Email comments during webcast:
coastalrm@calepa.ca.gov

Why We Are Here

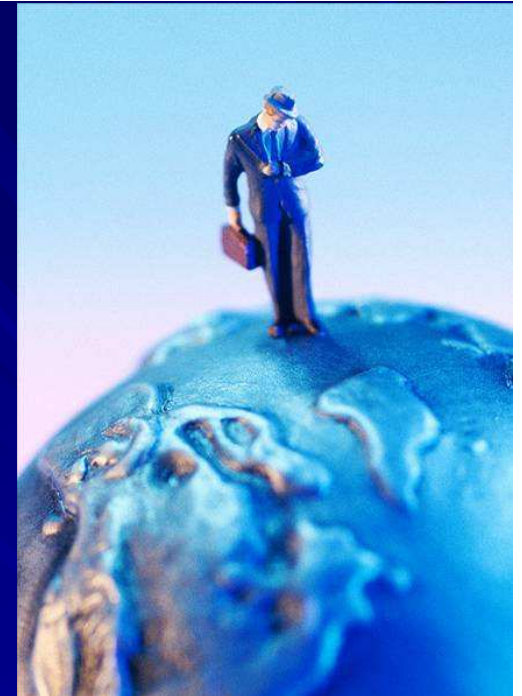
- Discuss mandatory GHG reporting requirements
 - Reporting
 - Emission estimation
 - Verification
- Overview of draft regulatory language
- Receive your comments on regulation and requirements
- **Comments needed by September 5**

How We Got Here

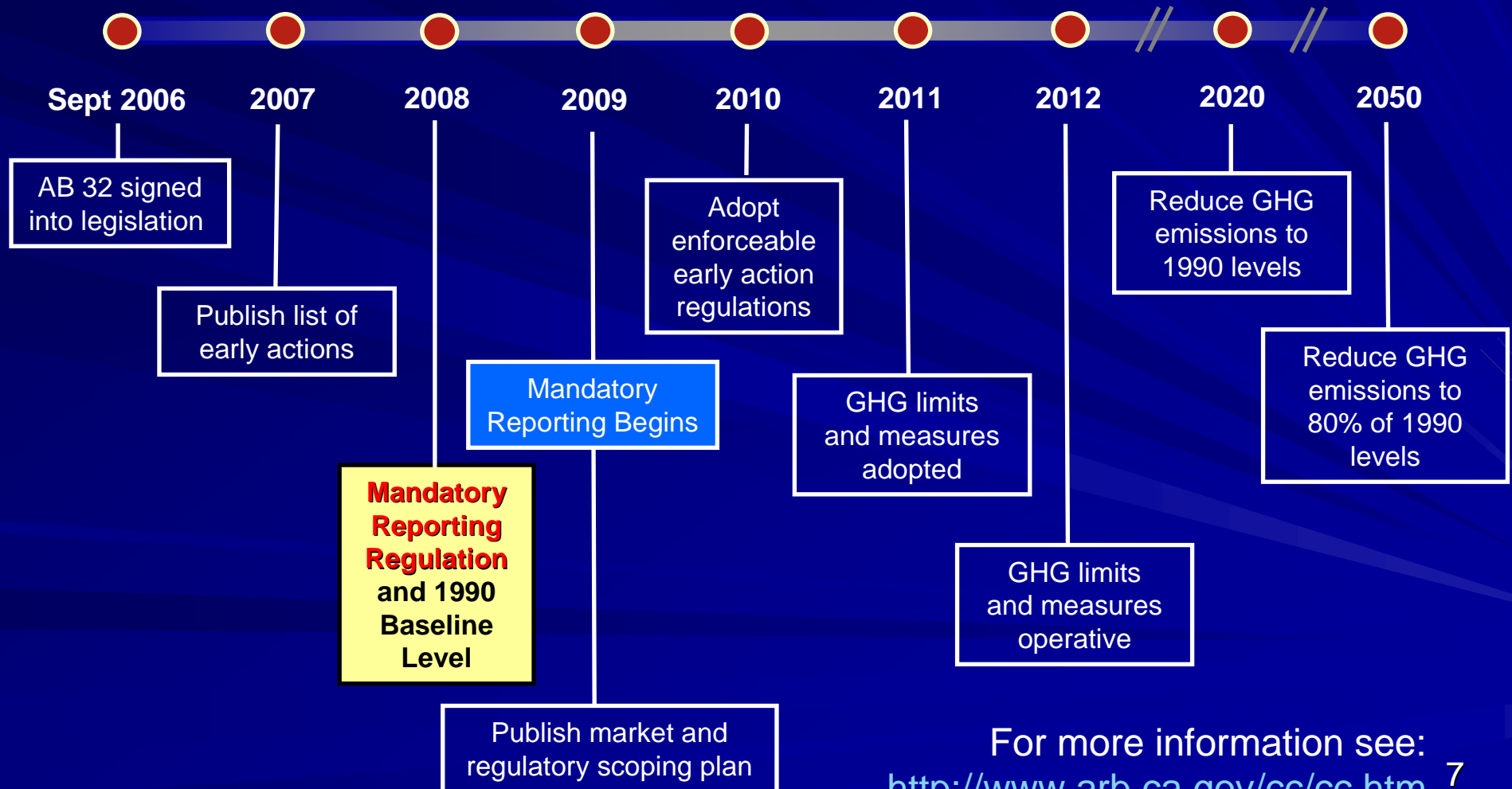
- Continuing stakeholder involvement in ARB process
- 3 previous workshops
- 15 workgroup meetings
- Numerous meetings and teleconferences
- Coordination with State agencies
- Coordination with California Climate Action Registry

The Process Ahead

- Collect comments on draft regulation language
- Prepare regulation proposal and staff report
- Release staff proposal for official 45 day comment period October 19
- Board Hearing in December to receive public testimony and consider staff proposal



California Global Warming Solutions Act of 2006 (AB 32)



AB 32 Statutory Requirements for Reporting



- Reporting regulation by January 1, 2008
- Begin with sources contributing the most to statewide emissions
- Account for all electricity consumed, including imports
- Use CCAR protocols as appropriate

Draft Regulatory Language

Regulation Organization

- Applicability – Who has to report
- Subarticle 1 – General Requirements
 - Definitions
 - General reporting requirements
 - Reporting and verification schedule
 - Record keeping, confidentiality, enforcement
- Subarticle 2 – Sector Specific Requirements
 - Cement, electric generating, retail providers, cogeneration, refineries, hydrogen plants, large stationary combustion sources

Regulation Organization (continued)

- Subarticle 3 – Calculation Methods for Multiple Sectors
 - CO₂ emissions from combustion using emission factors, heat content, carbon content, CEMS, etc.
 - Fugitive CH₄ emissions from coal storage
 - Indirect energy use
- Subarticle 4 – Verification Requirements
- Appendices – Detailed data reporting, SF₆ and HFC reporting

Applicability (§95101) Reporting Facilities

- Cement plants
- Oil refineries
- Hydrogen plants $\geq 25,000$ MT CO₂/yr
- Electric generating facilities and electric retail providers
- Cogeneration facilities
- Stationary combustion sources emitting $\geq 25,000$ MT CO₂/yr

94% of
point
source
CO₂
emissions



Major GSC Sectors Affected

(only if $\geq 25,000$ metric tonnes/yr CO₂ from combustion)

- Natural gas transmission
- Industrial gases
- Paperboard manufacture
- Colleges and universities
- Oil production
- Food processing
- Steel foundries
- Mineral processes
- Glass container
- Malt beverages

Landfills Reporting

- Energy production or combustion would bring in about 45 of 205 gas-collecting landfills
 - Power plants (≥ 1 MW)
 - Combustion emissions ($\geq 25,000$ MT/yr)
- Methods for site-specific methane estimation under development through:
 - ARB Early Action regulatory measures
 - CEC landfill study

Definitions (§95102)

- Regulation includes an extensive list of definitions used in regulation
- Please review and comment as these pertain to your sector and interest

Defining a Facility (definition #50)

- Property, plant, structure, installation, equipment, sources on one or more contiguous or adjacent properties
- Under common ownership or control
- Emits GHGs
- Considered a single major industrial source grouping



Operator & Operational Control (definitions #92 & #93)

- “operator” means the company or organization having operational control of the facility that is the subject of the report
- “operational control” means the authority to introduce and implement operating, environmental, health and safety policies; or, whole ownership of the facility;

Reporting: General Requirements (§95103(a))



- Annual reporting for each facility subject to regulation
- Responsible party with facility “operational control” must report
- Report emissions for specified facility sources and gases
- Report all purchased energy use

Reporting Requirements

- Report CO₂, N₂O, CH₄ from stationary source combustion
 - Report GHGs separately for each fuel used and each process unit (where feasible)
 - Use methods specified in regulation
 - Biomass emissions separately identified

Reporting Requirements (continued)

- Report process emissions as specified
- Report fugitive emissions as specified
- Report purchased energy consumption
- Report SF₆, HFC, PFC production, purchase and sale if applicable (50 lbs. or more)

Reporting Indirect Energy Use

- Electricity usage from utility bills
- Methodology
 - Facility operator provides annual electricity usage purchased and consumed
 - ARB to apply electricity emission factor specific to power provider
 - Indirect emissions = emission factor * annual electricity usage
- Imported steam, heating, cooling
 - Methods provided

Reporting Use of High-GWP Gases

- All facilities would report production, purchase or sale ≥ 50 pounds of HFCs, PFCs, or SF₆
- Regulation will include list of compounds
- Mass balance approach like U.S. EPA Partnership Program
 - Sample form in Appendix B

Reporting Process Overview

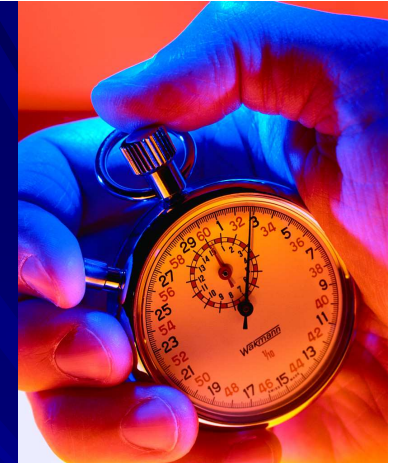
■ Reporting

- Facility submits required data to ARB by reporting deadline

■ Verification

- Verifier conducts verification and submits:
 - Detailed verification report to facility
 - Verification opinion to facility and ARB by verification deadline
- Detailed verification report is available to ARB as part of ARB's oversight process

Reporting and Verification Schedule (§95103(b))



- Generating Facilities and Cogeneration Facilities not operated by other reporters
 - Emissions reports due by April 30
 - Verification complete by August 31
- Retail Providers, and all other facilities
 - Emissions reports due by August 31
 - Verification complete by December 31

GHG Emissions Data Report (§95104)

- Facility identification info
- Facility contacts
- Emissions data
- Energy consumption
- Efficiency metrics as required
- Statement of compliance with requirements and certification of accuracy

GHG Emissions Data Report (continued)

- Maintain program to estimate GHG emissions
- Maintain transparent and independently verifiable data
- Certify report is accurate
- Provide internal audits and quality assurance of data

Document Retention

(§95105)

- Maintain procedures for document retention and record keeping
- ARB may request data used to generate emission estimates
- ARB may request full verification report and data
- Maintain all data used for emission calculations for seven years
- Detailed specifications in regulation

Confidentiality

(§95106)

- Not Confidential
 - Reported GHG emissions at facility level
 - Reported energy use data
 - Reported performance metrics
- Other data may be claimed as confidential during reporting
- Data not included in emissions report not required to be made public

Enforcement

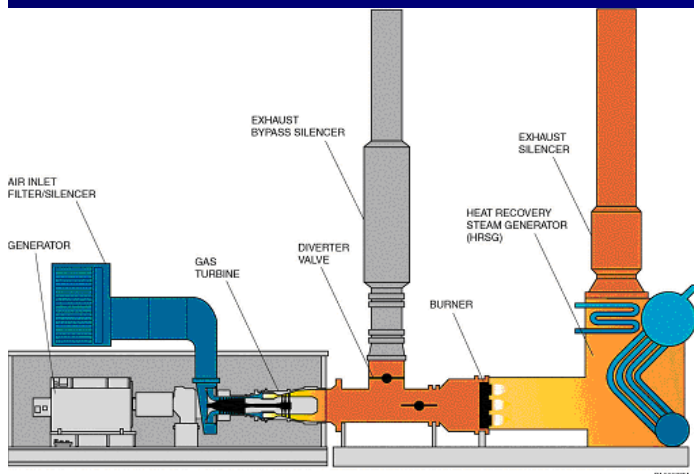
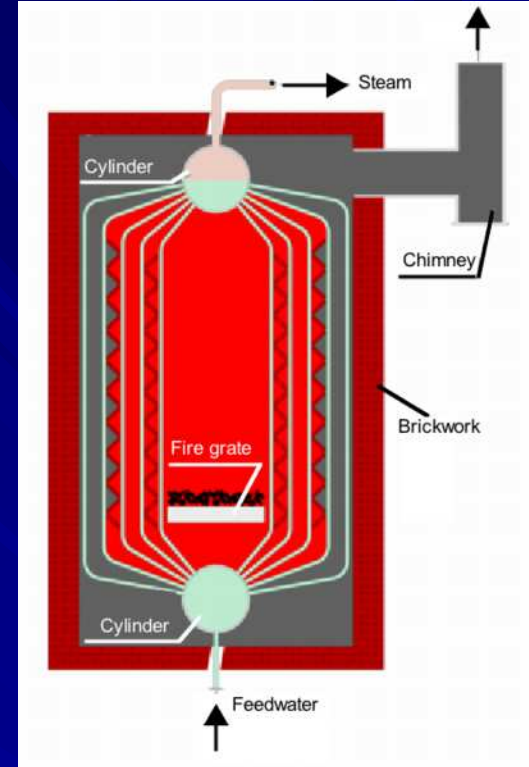
(§95107)

- Late submittal or false information would be a violation
- We will work closely with stakeholders to ensure compliance
- ARB will provide training for reporters and verifiers to assist with compliance

Comments on general reporting requirements?



General Stationary Combustion Sources (GSCs) (§95115)



Defining a General Stationary Combustion (GSC) Source

- Proposed facility threshold:

25,000 metric tonnes CO₂ per year

- Requirements separate from refineries, power and cement sectors
- Threshold consistent with EU reporting

Meeting the Threshold

- Emissions based on single facility emissions only
 - Each facility counted separately even if multiple facilities under common ownership
- Threshold determination based only on CO₂ emissions from stationary combustion
 - Does not include purchased electricity, heating, cooling
 - Does not include mobile, fugitive, or others

How Will You Know If You Are a GSC Source?

- ARB will work to ensure all $\geq 25,000$ metric tonnes GSC facilities know of requirements
- Fuel usage can be used to quickly approximate CO₂ emissions

Producing 25,000 Metric Tonnes of CO₂

Approximately equivalent to:

- ~ 2,800,000 gallons gasoline burned
- ~ 2,460,000 gallons diesel burned
- ~ 472,000 MMBtu natural gas burned
- ~ 263,000 MMBtu coal burned

GSC Requirements

- Calculate CO₂ from stationary source fuel combustion using ARB provided emission factors
 - Oil and gas production sources would conduct fuel tests must use more stringent method
- Report production/use of high GWP compounds
- Report indirect energy use
- Cogeneration facilities would use cogeneration methods for estimates

Calculating GSC Emissions

- Non-mobile sources:

- Turbines, boilers, internal combustion engines, flares, any backup generators or auxiliary equipment, etc.

- Basic methodology:

- Fuel use calculation

*Total annual emissions = emission factor * amount of annually consumed fuel*

- ARB will provide emission factors for various fuels

Emission Factors for GSCs

- CO₂, CH₄ and N₂O emission factors will be provided for each fuel type
 - Example: 53.05 kg CO₂/MMBtu for natural gas
- Separate document posted with draft emission factors; comments welcome

Comments on requirements for stationary combustion sources?



Verification

(§95130-33)

- Requirements
- Accreditation
- Conflict of Interest



Why Verification?



- AB 32 requires it
- Expected under international standards
- Experience with voluntary reporting shows the need
- Complexity of emissions estimation
- Critical for credibility of program

Verification

- Annual third-party verification for:
 - Refineries
 - Hydrogen plants
 - Oil and gas production facilities
 - Retail providers
 - Fossil-fueled power plants and cogeneration facilities ≥ 10 MW (if selling power)
- Triennial third-party verification for other sources

Third Party Verification

- Consistent with existing standards, including ISO
 - Already required for CCAR members
- Third party verifiers will assure data quality and reduce enforcement burdens
- Verifiers to be trained under ARB approved curriculum
 - Demonstrate expertise
 - Consistency in verification

Regulation to Specify

- Core GHG data verification requirements
- Accreditation requirements for verifiers
- Conflict-of-interest limitations

Verification Activities

- Site visits, Identify sources, and review data management systems
- Focus on most significant and uncertain sources
- Differences exceeding 5 percent considered significant
- Verification products
 - Detailed report to facility
 - Verification opinion to both facility and ARB

Detailed Verification Report

- Verification Plan
- Sampling Plan
 - Assess uncertainty risk of data management system, data acquisition equipment, emissions calculations
- Data checks focus on areas with high risk of uncertainty as determined in sampling plan
- Comparison of verifier data checks with reported data

Accreditation: Firms

- Only an accredited verification firm may submit a verification opinion.
 - Two lead verifiers
 - At least five total staff
 - Professional liability insurance
 - May subcontract with other ARB-accredited individual or firm verifiers

Accreditation: Lead Verifiers

- Lead verifier under CCAR and completed 3 verifications by 12/31/07; or,
- History of 3 yrs as State accredited verifier, completed 3 verifications as an apprentice lead, and passed an audit by the State; or,
- Project manager or lead developing GHG or emissions related inventories for 5 yrs, 2 yrs may be graduate level work; or,
- All must take State approved verification training and pass an exit exam, those that come in under previous criteria will have to take additional 'auditing' training.

Accreditation: Verifiers

- 4 yr degree: science, technology, statistics, business, environmental policy or economics
 - Or, work experience that provides technical skills to do verification
- 2 yrs in professional role in emissions management, technology, or other technical field with skills to conduct verification
- Must take part in ARB approved verification training and pass an exit exam

Conflict of Interest

■ Term Limit

- Verifiers to be changed after 6 years of conducting verification activities
- Allowed to resume with client after 1 year off cycle for verification

■ Conflict of Interest Policy

- Must agree not to act on behalf of reporting facility as both consultant and verifier concurrently or within any 3 year period

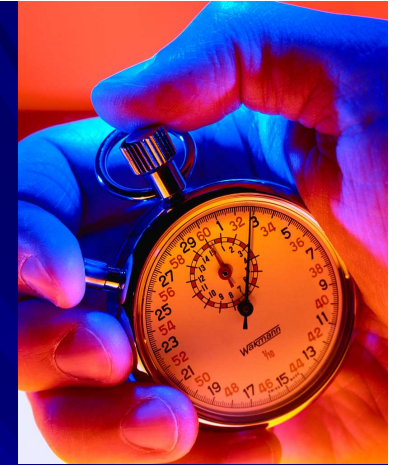
Pre-verification Process

- ARB will approve verification teams before verification activities take place.
- Teams must demonstrate acceptable level of conflict-of-interest and expertise for verifying the type of facility they contract with.

Verification Oversight

- ARB staff responsible for enforcing regulation
- Verification process will assist efforts to enforce compliance
- Targeted review of submitted data and verifiers

Reporting and Verification Schedule (§95103(b))



- Generating Facilities and Cogeneration Facilities not operated by other reporters
 - Emissions reports due by April 30
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 - Emissions reports due by August 31
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Verification Comments?



Cement Plants

(§95110)



Reporting Requirements

- Report CO₂, CH₄, and N₂O Emissions
- Direct Process Emissions
 - Clinker-Based Methodology
 - Total Organic Carbon (TOC) in Raw Materials
- Stationary Combustion
- Fugitive Emissions from Fuel Storage
- Indirect Energy Use
- Cogeneration
- Efficiency Metric

CO₂ Process Emissions Clinker Based Methodology

- Consistency with other Protocols
 - California Climate Action Registry
 - WBCSD Protocol
 - U.S. EPA Climate Leaders
- Plant-specific emission factors
 - Clinker
 - Cement Kiln Dust (CKD)



CO₂ Process Emissions

TOC Content in Raw Materials

- Organic carbon content of raw material
 - 0.2% Default Value
- Raw material consumed annually
- Convert carbon to CO₂
 - Molar Ratio (3.664)
- Proposed Additional Requirement
 - Plant-specific method to calculate TOC_{R.M.}



Stationary Combustion

- Quantity and Type of Fuel
- Cement kiln and non-kiln units
- Plant-specific emission factors
 - Natural Gas – HHV or Carbon Content
 - Coal, PET Coke & Other Fossil Fuels – Carbon Content
- Default emission factors
 - Other fuel types
 - N₂O and CH₄ emissions
- Option to Report Using CEMs

Efficiency Metric

- CO₂ emissions per metric tonne of cementious product
- Direct CO₂ emissions
 - Process-related
 - Stationary combustion
- Cementious Product
 - Clinker consumed or added to stock
 - Clinker sold
 - Gypsum, limestone, CKD, and clinker substitutes
 - Cement substitutes

Comments on Cement Plant Proposals?



Petroleum Refining, Hydrogen Plants, Oil and Gas Production

(§95113, 95114, 95115(b))



Refineries – Reporting Basics

- Annual reporting and verification for each facility
- Stationary combustion, process, fugitives
- Indirect energy usage (steam/heat, electricity, hydrogen)
- No mobile source requirements
- Gases as specified in the regulation
 - CO₂, CH₄, N₂O, HFCs

Stationary Combustion – CO₂

■ Refinery Fuel Gas

- Calculate a fuel specific EF
 - Hourly average HHV, CC daily
 - Use EF and daily average HHV to calculate CO₂ emissions

■ Natural Gas

(Regulation to be updated to reflect the following)

- Stationary combustion - CO₂ monthly HHV when HHV range is 975-1100 Btu/scf
- Outside Pipeline range – monthly carbon content to calculate CO₂ emissions

Process Emissions

■ Asphalt blowing

- Default EF uncontrolled emissions (2,555 scf CH₄/10⁶ bbl) EPA derived EF

■ Sulfur Recovery

- Default molar fraction CO₂ in gas to SRU (0.20) EPA EIIP based approach

Fugitive CH₄ Emissions

- Wastewater Treatment
 - IPCC 2006 – COD based CH₄ methodology
 - CH₄ conversion factor (0 – 1.0)
- Oil-Water separators
 - CONCAWE 2007 based methodology
 - Separator specific emission factors
- Storage Tanks
 - E&P Tank model (API)
- Equipment Fugitive Emissions
 - CAPCOA/CARB base methodology
 - Use component count, LDAR SV measurement, EF and correlation equation inputs

Flaring Emissions

- EPA EIIA based methodology
- AQMD/APCD flare reporting
 - Inputs
 - NMHC, CH₄ and ROG emissions
 - Assumed flare destruction efficiency
 - Assumed NMHC and ROG carbon fraction
- If flare reporting not required by AQMD/APCD
 - Use default EF based on refinery throughput

Oil and Gas Exploration and Production Sector

- Subject to reporting as a major source under the 25,000 metric ton threshold
 - Combustion sources only (CO_2 , CH_4 , N_2O)
 - Process, fugitives may be added later
- Methods and fuel sampling requirements would be identical to refinery sector
 - Associated gas also highly variable
- Cogeneration emissions per section 95112
 - Facility-specific efficiency values
- Hydrogen Plant emissions per section 95114

Hydrogen Production Facilities

- Report if combustion + process emissions $\geq 25,000$ metric tonnes
- Operational control determines whether hydrogen plants report as:
 - Part of a refinery or a stand-alone facility
- Report
 - Stationary combustion emissions – CO_2 , CH_4 , N_2O
 - H_2 Plant Process Emissions
 - weekly carbon test if natural gas only
 - daily carbon test if feedstock mixture
 - Hydrogen sales

Comments on Refineries, Oil/Gas Production or Hydrogen Plants?



Electric Generating Facilities and Electric Retail Providers (§95111)



Pending Issues

- “First Seller” Approach
- Consistent Use of CEMS vs Fuel-Based Data
- Additional Methods to be Explored
 - Combustion of Biomass and MSW
 - Fugitive CO₂ from Geothermal
 - N₂O and CH₄ from Fuel Combustion
 - Others

Who Would Report

- Generating Facilities ≥ 1 MW
 - Fossil Fuels, Landfill Gas, Biogas, Biomass, Municipal Solid Waste, Geothermal (excludes hydro, solar, wind, and nuclear)
- Retail Providers
 - IOUs, POU's, ESPs, CCAs, WAPA

Generating Facilities Would Report

- Nameplate Generating Capacity (MW)
- Annual Net Power Generation (MWh)
- Annual Fuel Consumption by Fuel Type
- Annual CO₂, N₂O, CH₄ from Fuel Combustion
- CO₂ from Acid Gas Scrubbers
- CH₄ from Coal Storage
- HFCs from Cooling that supports power generation
- CO₂ from Geothermal
- Wholesale Sales Exported Out-of-State (MWh) when known

Generating Units Would Report

- Nameplate Generating Capacity (MW)
- Annual Net Power Generation (MWh)
- Annual Fuel Consumption by Fuel Type
- Average Annual High Heat Value or Annual Steam Production
- Average Annual Carbon Content (if known)
- Annual CO₂, N₂O, CH₄ from Fuel Combustion

Retail Providers

- Facility Level and Generating Unit Information
 - Add Requirement to report Facility ID for hydro, wind, solar, nuclear?
- Fugitive SF₆ from Transmission and Distribution facilities maintained by Retail Provider
- Power Purchases (MWh)
 - Specified Sources Scaled to Reflect T&D
 - T&D Losses Also Reported as Subset (MWh)
 - Unspecified Sources by PNW, PSW, CAISO Markets, Other In-state, Unknown

Retail Providers (continued)

- Power Sales (MWh)
 - Retail Sales
 - Specified Wholesale Sales by Counterparty
 - Add Requirement to Report Facility ID
 - Unspecified Wholesale Sales by Region
- Indirect Electricity and Thermal Energy Purchased & Consumed (MWh and MMBtu) for Buildings

Methodologies

CO₂ from Fuel Combustion

■ Natural Gas

- 40 CFR Part 75
- Monthly Heat Content or Carbon Content or CEMS for others

■ Coal and Petroleum Coke

- 40 CFR Part 75 (including Appendix G)
- Monthly Carbon Content or CEMS (CO₂ or O₂) for others

■ Middle Distillates, Residual Oil, LPG

- 40 CFR Part 75
- Per delivery Heat Content or Carbon Content or CEMS for others

Methodologies CO₂ from Fuel Combustion

- Landfill Gas or Biogas
 - Measured Heat Content or Carbon Content
- Biomass or MSW
 - If available, CO₂ CEMS and flue gas flow meter
 - If not, Default Emission Factor
- Co-Firing
 - Report by Fuel Type
- Start-Up Fuels for Biomass
 - Default Emission Factor

Methodologies for Other Emissions

- Methods Using Default Emission Factors
 - N_2O & CH_4 from Fuel Combustion
 - Fugitive CH_4 from Coal Storage
 - Fugitive CO_2 from Geothermal
- Process SO_2 from Acid Gas Scrubber if no CEMS
- Fugitive SF_6 and HFCs
 - Mass Balance

Other Requirements

- Use of ASTM Method D6866 to Determine Biomass-Derived Portion of MSW
- Optional Reporting from Out-of-State Facilities
- Optional Additional Reporting for Asset Owning Suppliers
 - Add requirement to file “intention to report”?
- Annual Verification for most
- Triennial Verification for Biomass-Derived Facilities and Facilities ≤ 10 MW

ARB Database Subroutines

- Match facility emissions to specified purchases and specified sales
- Match unspecified purchases to unspecified emission factors for
 - PNW, PSW, CAISO Markets, Other In-State, or Unknown
 - Description of how factors are determined to be included in regulation
- Calculate emission factors for each retail provider for
 - Unspecified Wholesale Sales and Exports
 - Retail Sales

Comments on Retail Providers and Electrical Generating Facilities Proposals?



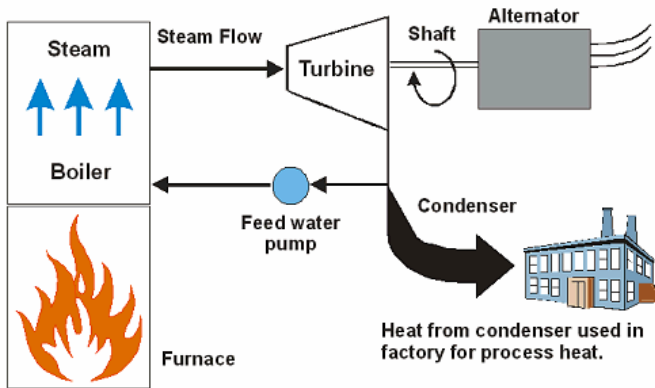
Cogeneration Facilities

(§95112)



Definitions and Terminology

- Cogeneration Facility Definition
 - Industrial structure, installation, plant, building, or self-generating facility
 - Simultaneous generation of multiple forms of useful energy in a single, integrated system.
- Cogeneration vs. Combined Heat and Power (CHP)
- Distributed (Allocated) Emissions



Cogeneration Facilities

■ Topping Cycle Plant

- Electric generation at the top or beginning of the cycle
- Thermal energy sent to the process after electricity production

■ Bottoming Cycle Plant

- Recovers steam or heat from a process stream to produce electricity.

Reporting Requirements

- Report CO₂, CH₄, and N₂O Emissions
- Facility and Generating Unit Information
- Electricity Generation
- Thermal Energy Production
- Distributed Emissions
- Indirect Energy Use

CO₂, N₂O, and CH₄ Emissions Methodologies

- Electric Generating Facility Requirements
- CO₂ from Fuel Combustion
 - Fuel Type
- CO₂ Process Emissions
 - Acid Gas Scrubbers
- GHG Fugitive Emissions
 - HFC from Cooling Units
 - CH₄ from Coal Storage
- N₂O and CH₄ from Fuel Combustion
 - Default Emission Factors

Distributed Emissions

- CO₂ Emissions from Fuel Combustion
 - Distributed between Thermal Energy and Electricity Generation
 - Distributed between Multiple Product Outputs
- Efficiency Method
 - Topping Cycle Plant
 - Facility-Specific Electricity Generation Efficiency
 - Default Value for Thermal Energy Efficiency
 - Option to calculate or use manufacturer rating
 - Bottoming Cycle Plant
 - ARB Request Comments for Requirements
- Detailed Efficiency Method
 - To Be Developed

Comments on cogeneration facilities?



Other Comments Today?

- Schedule
- Verification
- Methods
- Others?
- Comments by phone, email, writing are also encouraged
- Comments by September 5 will be most effective for staff proposal



Next Steps

- Collect comments on draft regulation language
- Prepare regulation proposal and staff report
- Release staff proposal for official 45 day comment period on October 19
- Board Hearing in December to receive public testimony and consider staff proposal



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Thank you for
attending.